



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/604,614 | 08/05/2003 | Tzu-Hsien Sang | AFAP0002USA | 1613 |
| 27765 | 7590 | 11/28/2006 | EXAMINER | |
| NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION P.O. BOX 506 MERRIFIELD, VA 22116 | | | | TRAN, KHANH C |
| ART UNIT | | PAPER NUMBER | | |
| | | 2611 | | |

DATE MAILED: 11/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|-------------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/604,614 | SANG ET AL. | |
| | Examiner Khanh Tran | Art Unit 2611 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 05 August 2006.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-14 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-6 and 10-14 is/are rejected.

7) Claim(s) 7-9 is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 08/05/2006 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date _____.
 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date _____.
 5) Notice of Informal Patent Application
 6) Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 4 is objected to because of the following informalities: in line 2, "amean" should be changed to -- a mean --. Appropriate correction is required.

2. Claim 5 is objected to because of the following informalities: in line 2, "medianof" should be changed to -- median of --. Appropriate correction is required.

3. Claim 6 is objected to because of the following informalities: in line 2, "ahistogram" should be changed to -- a histogram --. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 3, 4-5 and 10-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Peeters et al. U.S. Patent 6,628,738 B1.

Regarding claim 1, Peeters et al. invention is directed to a multi-carrier transmission system, wherein a clock timing error is calculated at the receiver's side and used for synchronization between a transmitting modem and a receiving modem (RX1).

In column 5 lines 5-45, referring to FIG. 1, a received signal is inputted to a skip and duplicate device S/D. An output of the skip and duplicate device S/D is connected to an input of the serial-to-parallel converter S/P and the outputs of this serial-to-parallel converter S/P are coupled to respective inputs of the fast Fourier Transformer FFT.

In column 6 lines 30-67, Peeters et al. further discloses that each signal at an output terminal of the Fourier transformer FFT represents a modulated carrier and can be seen as a vector point in a two-dimensional vector plane wherein the modulation constellation represents a set of points. The amplitude and phase that can be associated to this vector point in the two-dimensional vector plane correspond to the amplitude and phase of the modulated carrier at the output of the fast Fourier transformer FFT. The rotation device ROTOR, coupled to the fast Fourier transformer FFT, has the task to compensate for differences between the clocks in the transmitting modem, not drawn in the figure, and receiving modem RX1.

Further, in column 7 lines 10-35, the phase detection unit PHASE measures the phase of the signals at the output of the fast Fourier transformer FFT, it has to be noted that an alternative implementation of the phase detection unit PHASE may determine the difference between a received vector and an expected vector (determined by the closest constellation point in the constellation diagram) and can approximate the phase errors.

Finally, the clock timing error is calculated and output through FIL, see FIG. 1.

Regarding claim 3, as recited in claim 1 rejection, an alternative implementation of the phase detection unit PHASE may determine the difference between a received vector and an expected vector (determined by the closest constellation point in the constellation diagram) and can approximate the phase errors. The phase difference between a received vector and an expected vector (determined by the closest constellation point in the constellation diagram) is always within the range of 0 to 2 pi.

Regarding claims 4-5, the clock timing error is calculated from a plurality of pilot carriers and normalized; see column 7 lines 30-55 and FIG. 1.

Regarding claim 10, claim is rejected on the same ground as for claim 1 because of similar scope. Peeters et al. does not show demodulation module in the FIGs. However, a demodulation module is inherently included for demodulating frequency domain digital signal.

Regarding claims 11-12, claim is rejected on the same ground as for claims 4-5 because of similar scope.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peeters et al. U.S. Patent 6,628,738 B1 in view of Belotserkovsky et al. U.S. Patent 6,628,735 B1.

Regarding claim 2, Peeters et al. does not show the step of removing cyclic prefix from between contiguous symbols as set forth in the application claim.

Belotserkovsky et al. discusses in another US Patent that in OFDM system, the cyclic prefix is generally just a repetition of part of the symbol. This cyclic prefix is typically longer than the OFDM channel impulse response and, therefore, acts to prevent inter-symbol interference (ISI) between consecutive symbols; see column 4 lines 1-10. Belotserkovsky et al. further discloses the step of removing the cyclic prefixes from the OFDM signal before computing the discrete Fourier transform (DFT).

Peeters et al. and Belotserkovsky et al. teach in the same field of endeavor. As known in the art, cyclic prefixes are added to prevent inter-symbol interference (ISI) between consecutive symbols through channel and are removed at the receiving side. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made that Peeters et al. teachings can be modified to further include the

step of removing prefixes between consecutive symbols as discussed in Belotserkovsky et al. inventon.

6. Claims 6 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peeters et al. U.S. Patent 6,628,738 B1 in view of Ramasubramanian et al. U.S. Patent 7,133,474 B2.

Regarding claim 6, Peeters et al. does not teach utilizing a histogram as set forth in the application claim.

Ramasubramanian et al. teaches a timing recovery method for an OFDM system in another US Patent. Ramasubramanian et al. FIG. 8 shows a histogram for analyzing a timing estimate. Peeters et al. and Ramasubramanian et al. teach in the same field of endeavor. Furthermore, in column 8 lines 60-65, Peeters et al. estimates the clock timing difference from observations of the fast Fourier transform. Because histogram analysis would give a much more accurate representation of the timing error estimate of a plurality of pilot carriers, one of ordinary skill in the art at the time the invention was made would have been motivated to modify Peeters et al. teachings to implement the histogram analysis as discussed in Ramasubramanian et al. invention.

Regarding claim 13, claim is rejected on the same ground as for claim 6 because of similar scope.

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peeters et al. U.S. Patent 6,628,738 B1 in view of Van Acker et al. U.S. Patent 6,744,821 B1.

Regarding claim 14, Peeters et al. does not teach the serial-to-parallel converter capable of removing a prefix from between symbols.

Van Acker et al. discusses a multicarrier receiver as shown in FIG. 1 including a serial to parallel converter S/P with cyclic prefix extractor CE EXTRACT. Using the same argument and motivation as recited in claim 2 rejection, one of ordinary skill in the art at the time the invention was made would have been motivated to modify Peeters et al. serial to parallel S/P to implement serial to parallel converter S/P with cyclic prefix extractor CE EXTRACT as discussed in Van Acker et al. invention.

Allowable Subject Matter

8. Claims 7-9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ginesi et al. U.S. Patent 6,456,654 B1 discloses "Frame Alignment And Time Domain Equalization For Communications Systems Using Multicarrier Modulation.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 571-272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KCT

Khanh Cong Tran 11/25/2006
Primary Examiner
KHANH TRAN